MASTER OF SCIENCE
IN
METEOROLOGY

PREDICTION OF TROPICAL CYCLONE FORMATION IN THE WESTERN NORTH PACIFIC USING THE NAVY GLOBAL MODEL

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The Tropical Cyclone Vorticity Tracking Program is used to identify vortices in the western North Pacific from the Navy Operational Global Atmospheric Prediction System (NOGAPS) analyses and forecasts during May–October 2002 and 2003. Based on the NOGAPS analyses, several parameters are different between the 23 vortices that developed into storms during 2002 according to the Joint Typhoon Warning Center (JTWC) and the 231 vortices that did not develop. After eliminating 127 vortices that did not persist at least 24 hours, this left 104 non-developing cases. For the developing circulations, the average 850-mb relative vorticity value at the first JTWC-warning time was 5.0×10^{-5} s^{-1}, with an easterly deep layer wind shear of -1.8 m s^{-1}. The average 850-mb relative vorticity maximum for the non-developing cases was 3.3×10^{-5} s^{-1}, with a westerly vertical shear of 4.1 m s^{-1}. The NOGAPS model tends to over-forecast relative vorticity prior to formation time for both developers and non-developers. Especially for the 72-hour and 96-hour forecasts, the over-forecasting tendency leads to non-developing vortices meeting the threshold vorticity value of the developing vortices. The tendency for NOGAPS to forecast the non-developing deep layer wind shear to become increasingly easterly with time is considered to be a major factor in these over-forecasts of formation. Some adjustments in the cumulus parameterization heating and moistening plus convective momentum transport may improve these forecasts of tropical cyclone formation.

KEYWORDS: Tropical Meteorology, Tropical Cyclone Genesis, Tropical Cyclone Formation Forecasts